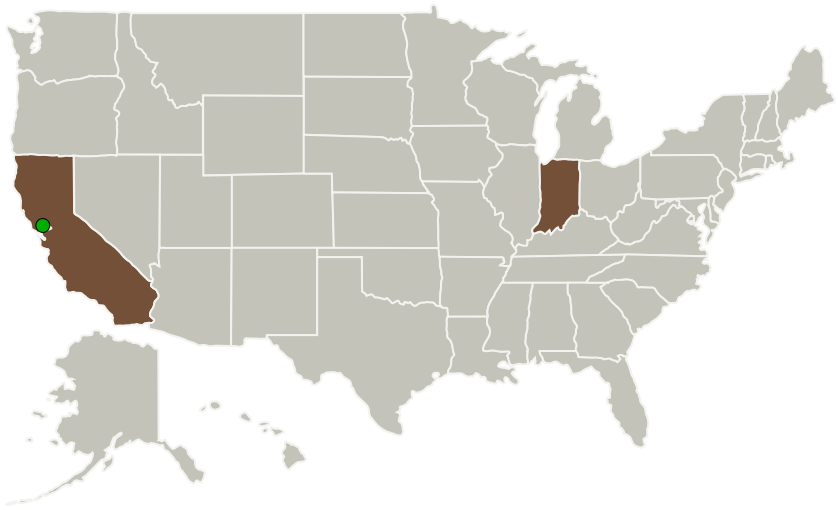
Soft Robotic Manipulators with Enhanced Perception using Multimodal Sensory Skins, Phase I

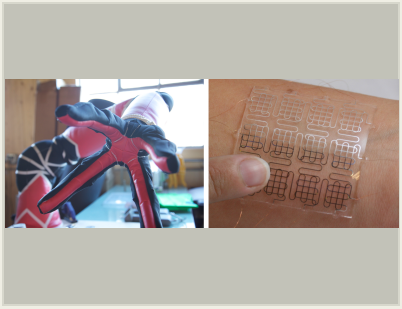
Completed Technology Project (2016 - 2017)

Project Introduction

We propose that the key to robotic automation in unstructured environments is compliant robotic manipulators that can tolerate, sense, and leverage contact in a feedback loop. We will demonstrate an instrumented end-effector that will be capable of enhanced perception through observed and controlled contact. This approach requires: (i) a network of sensors capable of capturing the highly compliant state of the soft robot and high resolution tactile sensors for multi-point contact, (ii) integrating these sensors with a core embedded system capable of processing large arrays of sensor data and (iii) development of algorithms that can extract state/tactile information to serve as high frequency feedback to the control system. The goal of this STTR is to transfer the promising technology of elastomeric sensors from the Purdue Faboratory's research setting into a commercial product. These sensors present a solution to the remaining piece of the puzzle of how to manage and leverage the additional degrees of freedom of Pneubotics' compliant systems. Towards this goal, Otherlab will serve as the commercial expert with a deployable platform. We will provide requirements and specifications for the sensor design as well as insight into integration challenges and cost constraints. The Faboratory will serve as the experts on liquid-embedded elastomeric sensors, optimizing the design and fabrication methods to serve the commercial applications. The full system demonstrations proposed in this Phase I are feasible because we will exploit the Pneubotics' manipulators and gripper designs that Otherlab has developed through government grants (NASA, DARPA), commercial partners, and private funding.

Primary U.S. Work Locations and Key Partners





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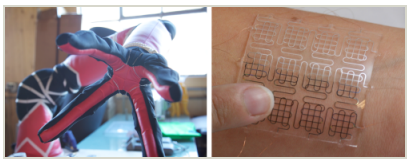
Organizations Performing Work	Role	Type	Location
Otherlab, Inc.	Lead Organization	Industry	San Francisco, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
Faboratory at Purdue University	Supporting Organization	Academia	West Lafayette, Indiana

Primary U.S. Work Locations	
California	Indiana

Images



Briefing Chart Image
Soft Robotic Manipulators with Enhanced Perception using Multimodal Sensory Skins, Phase I *(https://techport.nasa.gov/image/129569)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Otherlab, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

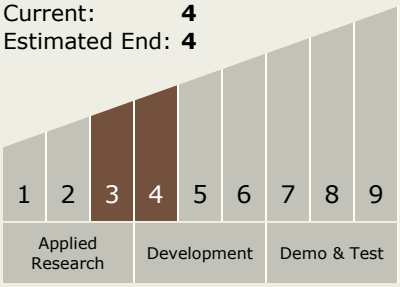
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Maria Telleria

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.1 Dexterous Manipulation